



**Establishment and Operation of a Regional System of Fisheries Refugia in the  
South China Sea and the Gulf of Thailand**

**REPORT**

**WATER QUALITY SURVEY IN THE WATERS OF BANGKA TO  
SUPPORT THE SQUID FISHERIES REFUGIA**

**BANGKA BELITUNG, INDONESIA**

**10 - 17 NOVEMBER 2021**

**Prepared by  
Riswanto**

**THE AGENCY FOR MARINE AND FISHERIES RESEARCH  
AND HUMAN RESOURCES (AMFRHR)  
MINISTRY OF MARINE AFFAIRS AND FISHERIES**

**REPUBLIC OF INDONESIA**

---

**SOUTHEAST ASIAN FISHERIES DEVELOPMENT CENTER  
TRAINING DEPARTMENT**



First published in Phrasamutchedi, Samut Prakan, Thailand in November 2021 by the SEAFDEC-UNEP-GEF Fisheries Refugia Project, Training Department of the Southeast Asian Fisheries Development Center

Copyright © 2021, SEAFDEC-UNEP-GEF Fisheries *Refugia* Project

This publication may be reproduced in whole or in part and in any form for educational or non-profit purposes without special permission from the copyright holder provided acknowledgement of the source is made. The SEAFDEC-UNEP-GEF Fisheries *Refugia* Project would appreciate receiving a copy of any publication that uses this publication as a source.

No use of this publication may be made for resale or for any other commercial purpose without prior permission in writing from the SEAFDEC Secretary-General at.

Southeast Asian Fisheries Development Center  
Training Department  
P.O.Box 97, Phrasamutchedi, Samut Prakan, Thailand  
Tel: (66) 2 425 6100  
Fax: (66) 2 425 6110  
<https://fisheries-refugia.org> and  
<https://seafdec.or.th>

**DISCLAIMER:**

The contents of this report do not necessarily reflect the views and policies of the Southeast Asian Fisheries Development Center, the United Nations Environment Programme, and the Global Environment Facility.

For citation purposes this document may be cited as:

Riswanto, 2021. Establishment and Operation of a Regional System of Fisheries Refugia in the South China Sea and Gulf of Thailand, Report of Water Quality Survey in the Waters of Bangka to Support the Squid Fisheries Refugia. Southeast Asian Fisheries Development Center, Training Department, Samut Prakan, Thailand; FR/REP/ID33, 8 p.

### Table of Contents

<b>1. Introduction .....</b>	<b>4</b>
<b>2. Result.....</b>	<b>4</b>
2.1. Aquatic environmental conditions .....	4
2.2. Conditions of Coastal Ecosystems: Mangroves, Seagrasses and Coral Reefs.....	6

### Table of Figures

<b>Figure 1</b> Spatial distribution of water quality parameters; a) surface temperature; b) salinity; c) turbidity level; d) acidity level; e) dissolved oxygen concentration; f) conductivity and g) total dissolved solids in the waters of Bangka .....	5
<b>Figure 2</b> Visual conditions of the waters a) Matras; b) Sungailiat and c) in and out of the ship to the Fishing Port Sungailiat at high tide.....	6
<b>Figure 3</b> a) the condition of the mangrove ecosystem of the Baturusa River estuary and b) the condition of the coral and seagrass ecosystems in the Mapur-Riausilip waters on the coast of Bangka waters .....	7

<b>Activity Title:</b>	Water quality survey in the waters of Bangka to support the squid refugia area concept
<b>Date of Activity:</b>	10-17 November 2021
<b>Venue:</b>	Bangka district-Bangka Belitung Islands
<b>Field Trip Activities:</b>	Collecting and measurement of several physical water variables such as water temperature, conductivity, brightness, turbidity, total dissolved solids (TDS), total suspended solids (total suspended solids/TSS) and water chemical variables such as salinity, pH, dissolved oxygen (DO); Visual observation of the coastal ecology

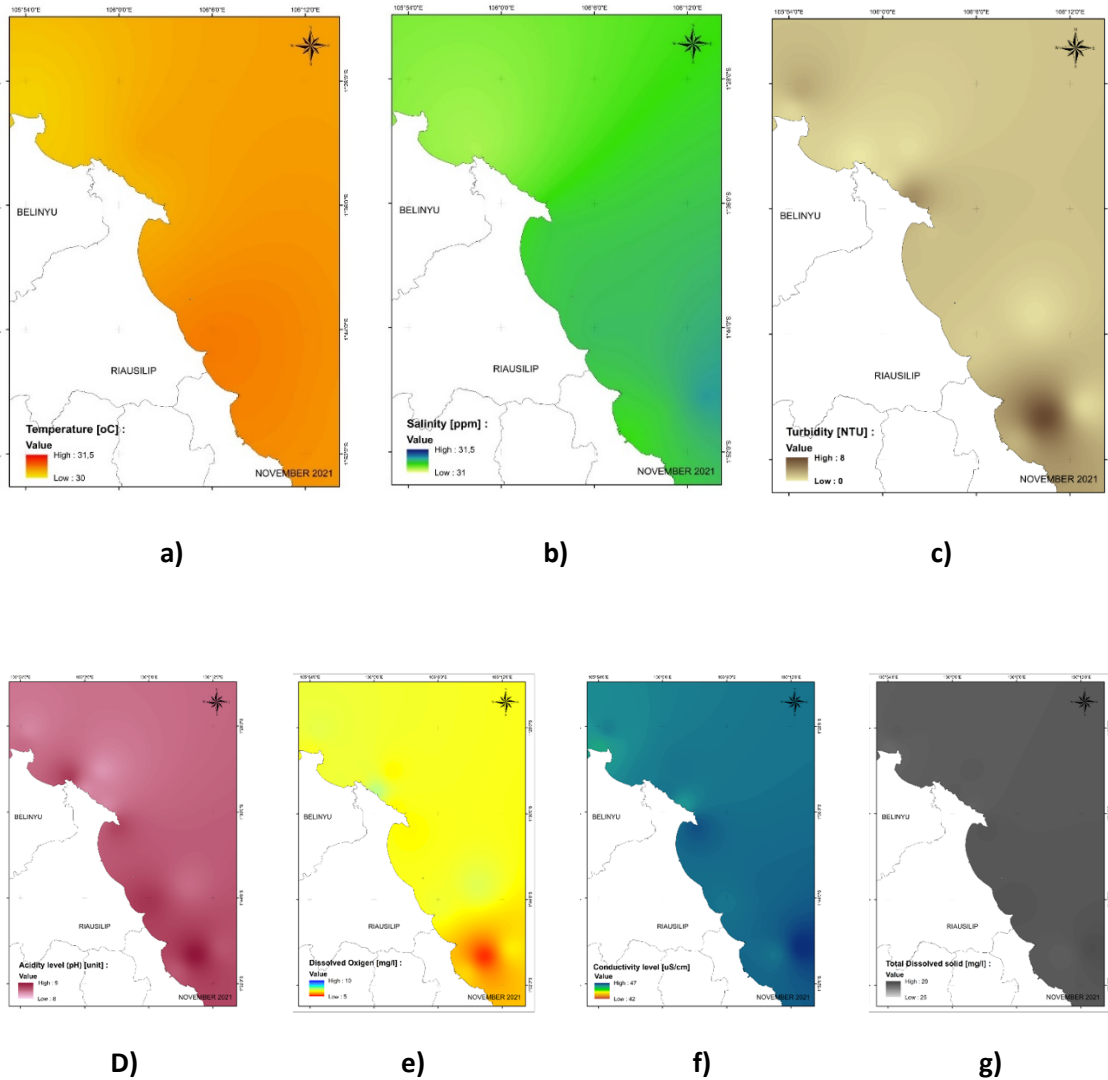
## 1. Introduction

Bangka waters are part of the Sunda Shelf (Sunda Shelf) so that these waters are included in shallow waters where the average water depth is 30 m. Water depth is a very influential factor in the existence of squid and in general squid are found living in shallow demersal waters, close to the coast, in seagrass and coral ecosystems to a depth of 700 m (Jereb & Roper, 2010). Several studies show that the catch of squid in the waters of the Karimata Strait to the Java Sea is mostly caught in waters with warmer temperatures ranging from 24,8 to 32,1 °C, where *U. chinensis* squid are mostly found in Bangka waters, generally live in the optimum temperature range of 21–29 °C (Prasetyo et al. 2014).

## 2. Result

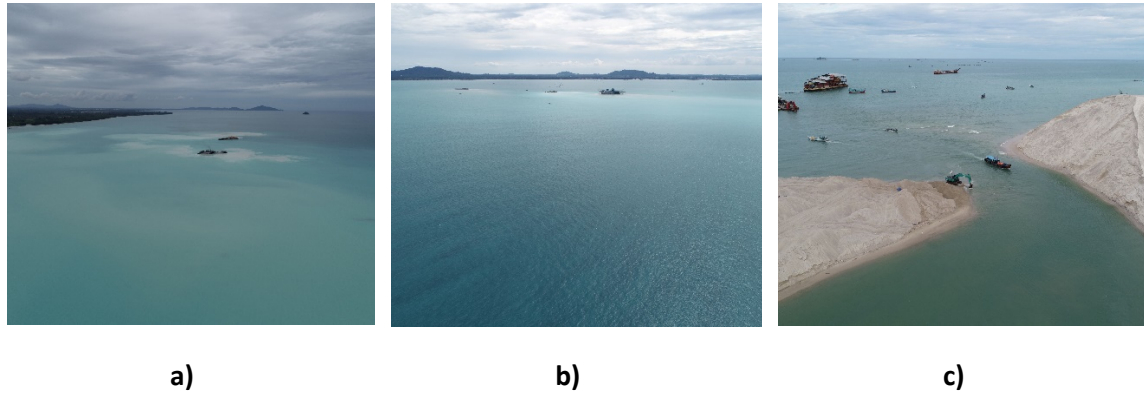
### 2.1. Aquatic environmental conditions

The survey activity to assess the waters quality of squid habitat was conducted 12 point stations at the coastal area of Bangka. The results of measurements of several water quality parameters show that in general the distribution of sea surface temperature (SST) in Bangka waters tends to be uniform between 29,97-31,13 oC; salinity range 30-30,5 ppt; acidity level (pH) between 8,31-8,99; and dissolved oxygen (DO) concentrations ranged from 5,13-7,45 mg/l. The value of total dissolved solid TDS at the study site shows that it tends to be evenly distributed with a range of values between 27,9-28,7 mg/l; the conductivity of the waters ranged from 45,8-47 µS/cm with the measured suspended solids concentration (TSS) varied between 7,00-37,00 mg/l (Figure 1). The lowest dissolved oxygen concentration at the time of measurement was found in the tin mining area with large suction vessels operating, this is also indicated by the highest turbidity value in the area (7.95 NTU) compared to other observation station areas.



**Figure 1** Spatial distribution of water quality parameters; a) surface temperature; b) salinity; c) turbidity level; d) acidity level; e) dissolved oxygen concentration; f) conductivity and g) total dissolved solids in the waters of Bangka

Visual observation of the coastal ecology and waters of Bangka using drones shows that the condition of mangroves in some areas has been converted into ponds. Changes in the condition of the coastal waters of Bangka are related to the high activity of tin mining both on land and mining activities in the waters using suction vessels along the waters of Bangka, both conventionally and unconventionally. This is indicated by the color gradation of coastal waters, especially in the area of operation of suction vessel that are actively mining in the waters of Tanjung Pesona, Sungailiat and Matras (Figure 2). The high activity of tin mining in Sungailiat waters also causes a buildup of sand and siltation in the inflow and outflow of ships leading to the fishing port dock area so that the entry and exit of ships is limited during high tide conditions.

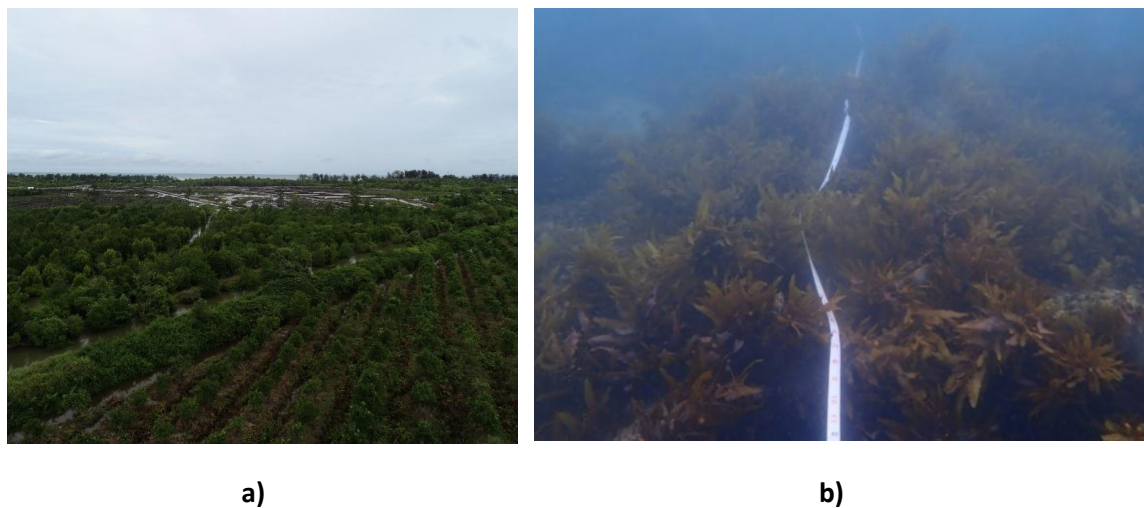


**Figure 2** Visual conditions of the waters a) Matras; b) Sungailiat and c) in and out of the ship to the Fishing Port Sungailiat at high tide

## 2.2. Conditions of Coastal Ecosystems: Mangroves, Seagrasses and Coral Reefs

Based on the description of the Allen Coral Atlas geomorphic zone using Planet Dove image data, it shows that the coastal waters of Bangka in the east are generally terrestrial reef flat areas and inner reef flats which then reach a depth of 15 m. in the form of shallow lagoons and reef slopes. Meanwhile, in the northern part, especially the coasts of Riau Silip and Belinyu, are areas of terrestrial reef plains and reef slopes. The basic conditions (benthic classes) of the waters of Bangka are mostly sandy plains with the coast being an area of rocks, rubble and coral/algae reefs on the northern coast.

Bangka waters are open waters in the northern, eastern and southern parts of Bangka Island, as well as semi-enclosed waters in the Bangka Strait and Kelabat Bay. Hydrologically the land and waters of Bangka are part of the Sunda Shelf where the average water depth is 30 m where the coastal ecosystem formed is also influenced by land activities through rivers such as the Baturusa, Tengkalat, Kepoh, Buluh, Kotawaringin, Layang, Manise and the Kurau River. Mangrove ecosystems that are formed in the waters of Bangka are generally found in the estuary area in the west and Teluk Kelabat in the north (Figure 3a). While in the east, mangroves are found in several estuaries of the Tengkalat River, Baturusa River and Kurau River. The area of potential mangrove ecosystems in the Bangka Belitung Islands is 81,405.44 ha, where in Bangka Regency it is identified as 9,162.4 ha with 14.7% good condition, moderate (28.2%) and 57.1% damaged (Department of Marine Affairs and Fisheries of the Bangka Belitung Islands Province, 2018).



**Figure 3** a) the condition of the mangrove ecosystem of the Baturusa River estuary and b) the condition of the coral and seagrass ecosystems in the Mapur-Riausilip waters on the coast of Bangka waters

The potential of coastal ecosystems that are aspects of the management of the squid refugia area are seagrass ecosystems and coral ecosystems. The results of the identification of the potential of seagrass ecosystems in the waters of Kep. Bangka Belitung is 11,646.9 ha and coral ecosystem is 17,744.85 ha, where most of the seagrass and coral ecosystems are in the waters of Kab. Belitung and several small islands in the waters of Central Bangka (Department of Marine Affairs and Fisheries of the Bangka Belitung Islands Province, 2018). The coastal waters of Bangka have the potential for seagrass ecosystems covering an area of 364 ha where the distribution of seagrass ecosystems is found in the northern waters of Mapur and Tengkalat which are generally associated with coral reef ecosystems (Figure 3b). The area of potential coral reef ecosystems in Bangka waters is 231.7 ha, which is concentrated in the northern waters of Mapur and Tengkalat as well as several reef flat points in Riau Silip waters. The performance condition of the coastal ecosystem is quite good in the northern waters of Bangka and West Bangka Regencies, making this water area one of the most important factors in the management and determination of the squid refugia area, especially as a nursery area.